chapter one

Introduction

In 1972, the President's Commission on Fire Prevention and Control published *America Burning*. This document was the first in-depth discussion of this country's fire problem, the most severe of the industrialized nations. Much progress has been made toward addressing the United States' fire problem since *America Burning*. No longer does the U.S. fire problem rank as the most severe of the industrialized nations. Nonetheless, the U.S. continues to experience fire death rates and property losses from fire twice that of most of its sister nations.[1] Many Americans are not aware of this nor of the nature of the fire problem.

This report is a statistical portrait of fire in the United States. It is intended for use by a wide audience, including the fire service, the media, researchers, industry, government agencies, and interested citizens. The report focuses on the national fire problem. The magnitude and trends of the fire problem, the causes of fires, where they occur, and who gets hurt are topics that are emphasized. One specific focus is on firefighter casualties—causes, types of injuries, etc.

This document is the thirteenth major edition of *Fire in the United States* published by the United States Fire Administration (USFA). The previous editions included:

- First edition published in 1978; included 1975–76 fire data
- Second edition published in 1982; included 1977–78 fire data
- Third through fifth editions produced as working papers, but not published
- Sixth edition published in 1987; included 1983 fire data
- Seventh edition published in 1991; included 1983–87 fire data
- Eighth edition published in 1991; included 1983–90 fire data
- Ninth edition published in 1997; included 1985–94 fire data and focused on the residential/non-residential fire problem and on firefighter casualties
- Tenth edition published in 1998; included 1986–95 fire data and provided a state-by-state profile of fires and an examination of firefighter casualties
- Eleventh edition published in 1999; included 1987–96 fire data and focused on the residential/non-residential fire problem and on firefighter casualties
- Twelfth edition published in 2001; included 1989–98 fire data; it was the last edition to use the NFIRS 4.1 data system and included analyses of all of the previous topics under

[1] "World Fire Statistics," *Geneva Association Information Newsletter*, October 2003, http://www.genevaassociation.org/FIRE%20N°19%20-%20October%202003.pdf The United States was reported at 1.55 fire deaths per 100,000 population for 1998–2000; Switzerland has the lowest European death rate at 0.64 per 100,000 population for 1997–1999.

one cover: residential and non-residential fire problems, state-by-state profiles, and firefighter casualties

This 13th Edition addresses the 10-year period 1992–2001. For the first time, the new NFIRS 5.0 data were used for the analyses. This report addresses the residential and non-residential fire problem and firefighter casualties.

SOURCES

The report is primarily based on the National Fire Incident Reporting System (NFIRS) data, but uses other sources as well. Summary numbers for fires, deaths, injuries, and dollar loss in each section are from the National Fire Protection Association's (NFPA's) annual survey of fire departments and NFPA's *Journal* articles on firefighter casualties.[2] It also uses mortality data from the National Center for Health Statistics (NCHS), population data from the U.S. Census Bureau, inflation adjustments from the Consumer Price Index, state statistics from state fire marshal offices or their equivalents, product information from the Consumer Product Safety Commission (CPSC), and health data from the NCHS. The USFA gratefully acknowledges the use of their information. Data sources are cited for each graph and table in this report.

National Fire Incident Reporting System

An indirect outgrowth of *America Burning*, the National Fire Incident Reporting System was established in 1975 as one of the first programs of the National Fire Prevention and Control Administration, which later became the United States Fire Administration (USFA). The basic concept of NFIRS has not changed since the system's inception. All states and all fire departments within them have been invited to participate on a voluntary basis. Participating fire departments collect a common core of information on fire and casualty reports using a common set of definitions. The data may be written by hand on paper forms or entered directly through a computer. Local agencies forward the completed NFIRS modules to the state agency responsible for NFIRS data. The state agency combines the information with data from other fire departments into a statewide database and then transmits the data to the National Fire Data Center (NFDC) at USFA. Data on individual fire incidents and casualties are preserved incident by incident at local, state, and national levels.

From an initial six states in 1976, NFIRS has grown in both participation and use. Over the life of the system, all 50 states, the District of Columbia, and more than 40 major metropolitan areas have reported to NFIRS. Over the life of the system, more than 30,000 fire departments have been registered by their states to participate in NFIRS. On a yearly basis, approximately

[2] A second approach for these summary numbers is to use the relative percentage of fires (or other loss measures) from NFIRS and scale up (multiply by) the NFPA estimate of total fires. The results would be somewhat different from those using the NFPA subtotals. NFPA totals have been used as the basis for the summary numbers in each section because they are consistent with the total number of fires from NFPA. Better estimates of fire loss measures from NFIRS will not be available until a more robust method of estimation is developed.

600,000 fire incidents and more than 7 million nonfire incidents are added to the database. NFIRS is the world's largest collection of incidents to which fire departments respond. Since 1985, the level of participation has remained relatively constant. A few states come in or leave the system each year. From 1992 to 1999, at least 39 states and the District of Columbia reported to NFIRS (Table 6). In 2000, the number of states increased to 43 and in 2001 an all-time high of 49 reporting states was achieved. The number of fire departments participating within the states has remained relatively constant as well, with a slight dip in participation during the system migration from version 4.1 to 5.0 in 1999 and 2000. Fire department participation has now returned to nearly 13,000 in 2001 (Figure 1). Within participating states, approximately 38 percent of the fire departments report (Table 7). The reporting departments represent a very large sample that enables us to make good estimates of various facets of the fire problem.[3] Although participation in NFIRS is voluntary, some states do require their departments to participate in the state system. The national goal is voluntary reporting by all states and the District of Columbia.

Table 6. States Reporting to NFIRS (1992–2001)

State	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Alabama	X	X	X	X	X	X	X	X	X	X
Alaska	X	X	X	X	X	X	X	X	X	X
Arizona		X	X	X						X
Arkansas	X	X	X	X	X	X	X	X	X	X
California	X	X	X	X	X		X			
Colorado	X	X	X	X	X	X		X	X	X
Connecticut	X	X	X	X	X	X	X	X	X	X
Delaware				X	X	X				X
District of Columbia	X	X	X	X	X	X	X	X		
Florida	X	X	X	X	X	X	X	X	X	X
Georgia	X	X	X	X	X	X	X	X	X	X
Hawaii	X				X	X	X	X	X	X
Idaho	X	X	X	X	X	X	X	X	X	X
Illinois	X	X	X	X	X	X	X	X	X	X
Indiana	X	X				X	X	X	X	X
Iowa	X	X	X	X	X	X	X	X	X	X
Kansas	X	X	X	X	X	X	X	X	X	X
Kentucky	X	X	X	X	X	X	X	X	X	X
Louisiana	X	X	X	X	X	X	X	X	X	X
Maine						X	X	X	X	X
Maryland	X	X	X	X	X	X	X	X	X	X
Massachusetts	X	X	X	X	X	X	X	X	X	X
Michigan	X	X	X	X	X	X	X	X	X	X
Minnesota	X	X	X	X	X	X	X	X	X	X
Mississippi									X	X
Missouri								X	X	X
Montana	X	X	X		X	X	X	X	X	X

[3] Data on the number of fire departments were provided by each state fire marshal office or equivalent organization.

Table 6. States Reporting to NFIRS (1992–2001) (continued)

State	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001
Nebraska	X	X	X	X	X	X	X	X	X	X
Nevada							X	X	X	X
New Hampshire	X	X	X	X	X	X	X		X	X
New Jersey	X	X	X	X	X	X	X	X	X	X
New Mexico			X		X				X	X
New York	X	X	X	X	X	X	X	X	X	X
North Carolina									X	X
North Dakota										X
Ohio	X	X	X	X	X	X	X	X	X	X
Oklahoma	X	X	X	X	X	X	X	X	X	X
Oregon	X	X	X	X				X	X	X
Pennsylvania										X
Rhode Island	X	X	X	X						X
South Carolina	X	X	X	X	X	X	X	X	X	X
South Dakota	X	X	X	X	X	X	X	X	X	X
Tennessee	X	X	X	X	X	X	X	X	X	X
Texas	X	X	X	X	X	X	X	X	X	X
Utah	X	X	X	X	X	X	X	X	X	X
Vermont	X	X	X	X	X	X	X	X	X	X
Virginia	X	X	X	X	X	X	X	X	X	X
Washington	X	X	X	X	X	X	X	X	X	X
West Virginia	X	X	X	X	X	X	X			X
Wisconsin		X	X	X	X	X	X	X	X	X
Wyoming	X	X	X	X	X	X	X	X	X	X
Total	40	41	41	40	40	40	40	40	43	49

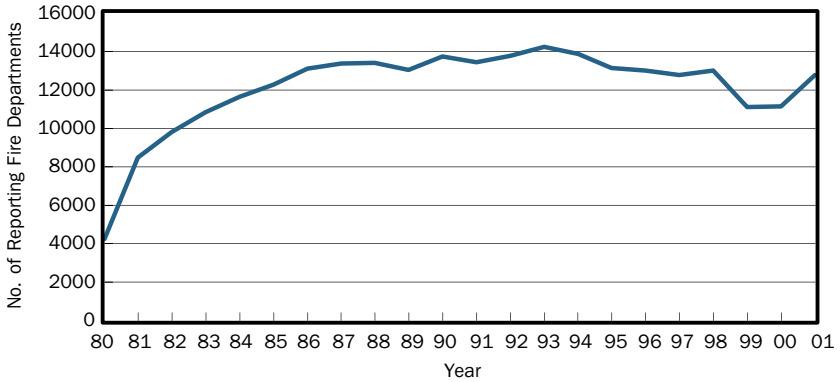

Figure 1. NFIRS Participation (1980–2001)

Table 7. Fire Departments Reporting to NFIRS in 2001

State	No. of Reporting Fire Departments	No. of Fire Departments in State	Fire Departments Reporting (percent)
Alabama	98	1,100	9
Alaska**	14	320	4
Arizona*	3	350	1
Arkansas*	400	985	41
California*	0	1,186	0
Colorado	18	394	5
Connecticut	203	304	67
Delaware	19	61	31
District of Columbia	0	1	0
Florida*	263	672	39
Georgia	128	674	19
Hawaii*	3	4	75
Idaho	153	236	65
Illinois	721	1,253	58
Indiana	429	959	45
Iowa	431	860	50
Kansas*	505	666	76
Kentucky	447	827	54
Louisiana*	272	604	45
Maine	32	421	8
Maryland	341	367	93
Massachusetts	309	365	85
Michigan*	855	1,079	79
Minnesota	660	786	84
Mississippi*	100	754	13
Missouri	245	916	27
Montana	159	368	43
Nebraska	236	478	49
Nevada**	20	210	10
New Hampshire	90	245	37
New Jersey*	423	810	52
New Mexico*	8	366	2
New York	1,307	1,857	70
North Carolina*	170	1,316	13
North Dakota	147	386	38
Ohio*	1,126	1,240	91
Oklahoma	88	904	10
Oregon	259	335	77
Pennsylvania*	17	2,164	1
Rhode Island	3	79	4
South Carolina	86	740	12
South Dakota	147	363	40
Tennessee*	265	662	40
Texas	614	1,964	31
Utah*	146	250	58
Vermont*	115	243	47
Virginia*	326	596	55
Washington	171	544	31

Table 7. Fire Departments Reporting to NFIRS in 2001 (continued)

State	No. of Reporting Fire Departments	No. of Fire Departments in State	Fire Departments Reporting (percent)
West Virginia*	11	446	2
Wisconsin*	52	880	6
Wyoming	101	154	66
Total	12,735	33,744***	38

* The number of state fire departments was not available from state fire marshal offices (or equivalent agencies) at the time of publication. For these states, the number of fire departments was taken from the 12th Edition of *Fire in the United States, 1989–1998.*

** Alaska reported 240 fire departments in the state to USFA, and Nevada has reported 147 departments. Because these totals may be incomplete, the totals given in the 12th Edition are used.

*** This total differs from the 2001 NFPA estimate of 30,020 fire departments. The NFPA estimate is the official estimate used by USFA in its National Fire Department Census.

Sources: NFIRS and state fire marshal offices or equivalent organizations

The USFA established the National Fire Department Census in the fall of 2001 when the USFA launched a nationwide campaign for voluntary registration of fire departments by means of direct mailing, coordination with fire service organizations and state offices, referencing existing data sources, and conference promotions. By September 2004, more than 22,800 fire departments have registered with the census—approximately 75 percent of the estimated number of U.S. fire departments.

The database created by the census is intended for use by the fire protection and prevention communities, allied professions, the general public, and the USFA. USFA will use the database to conduct special studies, guide program decisionmaking, and improve direct communication with individual fire departments. The database provides a current directory of registered fire departments and includes basic information such as addresses and department types, Web site addresses (if applicable), and number of stations. The survey also collects information that will be released in summary format only: number of personnel and specialized services. For more information about the National Fire Department Census, visit http://www.usfa.fema.gov/applications/fdonline.

Corresponding to increased participation, the number of fires, deaths, and injuries as well as estimates of dollar loss reported to NFIRS has also grown—an estimated 33 percent of all U.S. fires to which fire departments responded in 2001 were captured in NFIRS.

There are, of course, many problems in assembling a real-world database, and NFIRS is no exception. Although NFIRS does not represent 100 percent of incidents reported to fire departments each year, the enormous sample size and good efforts by the fire service result in a huge amount of useful information. Because of advances in computer technology over the past 25 years and improvements suggested by participants, NFIRS has been revised periodically in response. The newest revision, NFIRS 5.0, became operational in January 1999.

NFIRS 5.0 captures information on all incidents, not just fires, to which a fire department responds. In addition to many data coding improvements, Version 5.0 provides five new mod-

ules that recognize the increasingly diverse activities of fire departments today: an Emergency Medical Service (EMS) Module, a Wildland Fire Module, an Apparatus Module, a Personnel Module, and an Arson Module. Other modules have been extensively revised.

The modular design of NFIRS 5.0 makes the system easier to use than previous NFIRS versions because it captures only the data required to profile the extent of the incident. Some fires, for example, require just basic information to be recorded, whereas others require considerably more detail. The accuracy and reliability of the collected data are improved because of the way questions are asked and data are coded.

States' participation is voluntary, and each state specifies requirements for its fire departments. States have the flexibility to adapt their state reporting systems to their specific needs. As a result, the design of a state's data collection system varies from state to state. NFIRS 5.0 was designed so that data from state systems can be converted to a single format that is used at the national level to aggregate and store NFIRS data.

Uses of NFIRS

NFIRS data are used extensively at all levels of government for major fire protection decisions. At the local level, incident and casualty information is used for setting priorities and targeting resources. The data now being collected are particularly useful for designing fire prevention and educational programs and EMS-related activities specifically suited to the real emergency problems the local community faces.

At the state level, NFIRS is used in many capacities. One valuable contribution is that state legislatures use these data to justify budgets and to pass important bills on fire-related issues such as sprinklers, fireworks, and arson. Many federal agencies, in addition to USFA, make use of NFIRS data. NFIRS data are used, for example, by the Consumer Product Safety Commission to identify problem products and to monitor corrective actions. The Department of Transportation uses NFIRS data to identify fire problems in automobiles, which has resulted in mandated recalls. The Department of Housing and Urban Development uses NFIRS to evaluate safety of manufactured housing (mobile homes). The USFA uses the data to design prevention programs, to order firefighter safety priorities, to assist in the development of training courses at the National Fire Academy, and for a host of other purposes. Thousands of fire departments, scores of states, and hundreds of industries have used the data. The potential for even greater use remains. One of the purposes of this report is to give some idea of the types of information available from NFIRS. The information here is highly summarized; much more detail is available. The USFA report, *Uses of NFIRS: The Many Uses of the National Fire Incident Reporting System*, further describes the uses of the data. It may be ordered directly from the USFA or is available online at http://www.usfa.fema.gov/applications/publications.

METHODOLOGY

Each edition of *Fire in the United States* refines and improves upon the last. In this edition, as in previous ones, an attempt has been made to keep the data presentation and analysis as straightforward as possible. It is also the desire of the USFA to make the report widely accessible to many different users, so it avoids unnecessarily complex methodology. Throughout this report, the term *fire casualties* refers to deaths and injuries; the term *fire losses* collectively includes fire casualties and dollar loss.

September 11, 2001 Casualties

The tragic events of September 11, 2001 resulted in 2,451 civilian and 341 firefighter casualties.[4] Due to the circumstances of the event, these casualties are necessarily considered fire and explosion casualties and are included in the overall totals reported in this document. These casualties, however, are not included in trends or fire cause distributions.

National Estimates

With the exception of the summary totals at the beginning of each section, the numbers in this report are scaled up national estimates or percentages, not just the raw totals from NFIRS. Many of the estimates are derived by computing a percentage of fires in a particular category using NFIRS and multiplying it by the total number of fires, deaths, injuries, or dollar loss from the NFPA annual survey. For example, the national estimate for the number of residential cooking fires was computed by taking the percentage of NFIRS residential fires (with known causes) that were attributed to cooking and multiplying it by the estimated total number of residential fires from the NFPA survey. This methodology is the accepted practice of national fire data analysts.

Ideally, one would like to have all of the data come from one consistent data source. But because the "residential population protected" is not reported to NFIRS by many fire departments and the reliability of that data element is suspect in many other cases, especially where a county or other jurisdiction is served by several fire departments that each report their population protected independently, this data element was not used. Instead, extrapolations of the NFIRS sample to national estimates are made using the NFPA survey for the gross totals of fires, deaths, injuries, and dollar loss.

One problem with this approach is that the proportions of residential, non-residential, mobile property, and outside fires and fire deaths differ between the large NFIRS sample and the NFPA survey sample. To be consistent with approaches being used by the CPSC and NFPA, we have used the NFPA estimates of fires, deaths, injuries, and dollar loss for residential, non-residential, mobile, and outside properties as a starting point. The details of the national fire

[4] These 341 firefighter casualties do not include 3 WTC fire safety directors who received benefits from the Department of Justice's Public Safety Officers' Benefits Program based on the *Report of Public Safety Officer's Death* submitted by FDNY.

problem below this level are based on proportions from NFIRS. One will not get the same numbers starting from the total NFIRS proportions of residential, non-residential, etc., as from the NFPA proportions. This inconsistency will remain until all estimates can be derived from NFIRS alone.

Unknowns

On a fraction of the incident reports or casualty reports sent to NFIRS, the desired information for many data items is either not reported or reported as "unknown." The total number of blank or unknown entries is often larger than some of the important subcategories. For example, 47 percent of residential fires with fatalities reported in 2001 do not have sufficient data reported to NFIRS to determine cause. The lack of data, especially for fatal fires, masks the true picture of the fire problem. Many prevention and public education programs use NFIRS data to target at-risk groups or to address critical problems, fire officials use the data in decisionmaking that affects the allocation of firefighting resources, and consumer groups and litigators use the data to assess product fire incidence. When the unknowns are large, the credibility of the data suffers. Fire departments need to be more aware of the effect of incomplete reporting.

Adjusted Percentages

In making national estimates, the unknowns should not be ignored. The approach taken in this report is to provide not only the "raw" percentages of each cause category, but also the "adjusted" percentages computed using only those incidents for which the cause was provided. This in effect distributes the fires for which the cause is unknown in the same proportion as the fires for which the cause is known, which may or may not be approximately right. That is the best we can do without additional knowledge of the nature of the unknowns.

To illustrate: Smoking was reported as the fire cause for 3.6 percent of all reported residential fires in 2001; another 33.7 percent of reported fires had cause unknown. Thus, the percent of fires that had their cause reported was $100 - 33.7 = 66.3$ percent. With the unknown causes proportioned like the known causes, the adjusted percent of residential fire fatalities caused by smoking can then be computed as $3.6/66.3 = 5.4$ percent.

In this edition, both the reported data and the adjusted data for causes are plotted on the bar charts.

Representativeness of the Sample

The percentage of fire departments participating in NFIRS varies from state to state, with some states not participating at all. To the best that USFA can determine, the distribution of participants is reasonably representative of the entire nation, even though the sample is not random. The sample is so large—33 percent of all fires—and so well distributed geographically and by size of community that there is no known major bias that will affect the results. In a current study effort, USFA and NFPA are examining the biases in NFIRS participation, specifically

whether the fire experience of NFIRS reporting departments differs systematically from the fire experience of other nonreporting departments within the same population.

Most of the NFIRS data exhibit stability from one year to another, without radical changes, as will be observed from most of the 10-year trend lines presented throughout this report. Results based on the full data set are generally similar to those based on part of the data, another indication of data reliability. Although improvements could be made—the individual incident reports could and should be filled out more completely and more accurately than they are today (as can be said about most real-world data collections as large as NFIRS), and all participating departments should have the same reporting requirements—the overall portrayal is a reasonably accurate description of the fire situation in the United States.

NFIRS 5.0 Changes

Another area to consider is the effect that the differences between the current NFIRS and older versions have, or may have, on analysis of fire topics. These differences, the result of both coding changes and data element design changes, have necessitated revisions to long-standing groupings and analyses used in this report. The definitions of some property types, the cause methodology, smoke alarm performance, and streamlined reporting for qualified incidents are among those areas that required attention. These revisions may have resulted in subtle changes in overall trends.

For property types, several notable changes are reflected in this edition. Detached residential garages, a subset of non-residential storage properties previously included in the discussion of residential structures, are now included with non-residential properties. Vacant and under construction is now an attribute of a structure and is no longer considered a separate property type. Fires occurring in vacant or under construction structures on non-residential properties are included in a separate discussion; vacant or under construction residential structures are not addressed in this edition.

A new cause methodology that accommodates NFIRS 5.0 variables in the cause hierarchy was developed. Overall, the transition in cause trends between the NFIRS 4.1 database and the 5.0 database has been seamless.

The new, limited reporting of confined, no-loss structure fires allows the fire service to capture incidents that either might have gone unreported prior to the introduction of NFIRS 5.0 or were reported, but as a nonfire fire incident as no loss was involved.[5] In 2001, these confined fires accounted for 18 percent of structure fires. More than 75 percent of these confined fires were no-loss cooking fires (55 percent) and heating fires (23 percent). Except where noted, these confined fires are included in analyses. The addition of these fires results in increased proportions of cooking and heating fires in analyses of fire cause. In other analyses, the inclusion of

[5] Some states routinely reported such non-loss fires as smoke scares. The result, from a reporting viewpoint, is that the incident is reported but not coded as a fire incident.

confined fires may result in larger unknowns than in previous editions of this report as detailed reporting of fire specifics (e.g., room of origin) is not required.

One of the most important changes is in the data format itself. All data in the system, regardless of its entry mechanism, are in NFIRS 5.0 format; non-NFIRS 5.0 data are converted to the 5.0 format. The proportion of native 5.0 data has steadily increased since the introduction of NFIRS 5.0 in 1999 (Table 8). At the time of publication, this proportion rose to 69 percent in the preliminary 2002 data.

Table 8. NFIRS Fire Data Reporting by Version

Year	NFIRS 4.1 (converted to 5.0 format)	Native NFIRS 5.0
1999	93%	7%
2000	79%	21%
2001	52%	48%
2002*	31%	69%

*Preliminary

All charts with multiyear data points distinguish between the years in which NFIRS 4.1 format data (1992–1998) and NFIRS 5.0 format data (1999–2001) were used.

Trend Data

A frequently asked question is how much a particular aspect of the fire problem has changed over time. The usual response is in terms of a percentage change from one year to another. As we are dealing with real-world data that fluctuate from year to year, a percent change from one specific year to another can be misleading. This is especially true when the beginning and ending data points are extremes—either high or low. For example, in Figure 31, "Trends in One- and Two-Family Dwelling Fires and Fire Losses," the percent change from 1992 of 3,160 deaths to 2001 of 2,650 would be a decrease of 16.1 percent. Yet, if we were to choose 1994 as the beginning data point (2,785 deaths), this change would show a 4.8 percent decrease. As we are interested in *trends* in the U.S. fire problem, this edition of *Fire in the United States* reports the overall change in a data series as a trend. We have computed the best-fit linear trend line (which smooths fluctuations in the year-to-year data) and present the change over time based on this trend line. In this example, the overall 10-year trend is a decrease in deaths of 15.6 percent. As noted above, trends that incorporate NFIRS data from the new 5.0 system may have subtle changes as a result of the system design and not a true trend change.

New in this edition is the plotting of the 10-year trend line juxtaposed with the actual data points.

Cause Categories

The causes of fires are often a complex chain of events. To make it easier to grasp the "big picture," 13 major categories of fire causes such as heating, cooking, and children playing are used by the U.S. Fire Administration here and in many other reports. The alternative is to present scores of detailed cause categories or scenarios, each of which would have a relatively small percentage of fires. For example, heating includes subcategories such as misuse of portable space heaters, wood stove chimney fires, and fires involving gas central heating systems. Experience has shown that the larger categories are useful for an initial presentation of the fire problem. It then can be followed by more detailed analysis.

The cause categories displayed in the graphs are listed in the same order to make comparisons easier from one to another. The x-scale varies from figure to figure depending on the largest percentage that is shown; the x-scale on a figure with multiple charts, however, is always the same. The order here also is the same as used in previous *Fire in the United States* editions.

The cause categories used throughout most of this report were designed to reflect the causes of structure fires—where the majority of fatal fire deaths occur. While these categories have usefulness for the other property types, there are limitations. For example, in vehicle fires, these limitations are such that the cause categories are not used.

An additional problem to keep in mind when considering the rank order of causes in this report is that sufficient data to categorize the cause were not reported to NFIRS for all fatal fires in the database. The rank order of causes might be different than shown here if the cause profile for the fires whose causes were not reported to NFIRS were substantially different from the profile for the fires whose causes were reported. However, there is no information to indicate that there is a major difference between the knowns and the unknowns, and so our present best estimate of fire causes is based on the distribution of the fires with known causes.

Fires are assigned to one of the 13 general cause groupings using a hierarchy of definitions, approximately as shown in Table 9.[6] A fire is included in the highest category into which it fits on the list. If it does not fit the top category, then the second one is considered, and if not that one, the third, and so on. (See Table 9 footnote (*) for examples.)

In the transition from NFIRS 4.1 to 5.0, most coding definitions for the causes transferred well. Incendiary and suspicious fires and children playing fires are the exceptions and required a new coding approach to capture these causes. For example, suspicious fires are no longer captured directly and included in the arson totals, and children playing is generally defined by whether "age was a factor" with an age less than 10. In the trend charts presented in this report,

[6] The exact hierarchy and specific definition in terms of the NFIRS 5.0 codes may be found at http://www.nfirs.fema.gov/download/50causematrix01012004.xls The actual hierarchy involves a large number of subcategories that are later grouped into the 13 major categories.

Table 9. Hierarchy of Cause Groupings Used in This Report

Cause Category*	Definition
Exposure	Caused by heat spreading from another hostile fire
Incendiary/Suspicious	Fire deliberately set or suspicious circumstances
Children Playing	Includes all fires caused by children playing with any materials contained in the categories below
Natural	Caused by Sun's heat, spontaneous ignition, chemicals, lightning, static discharge
Smoking	Cigarettes, cigars, pipes as accidental heat of ignition
Heating	Includes central heating, fixed and portable local heating units, fireplaces and chimneys, water heaters as source of heat
Cooking	Includes stoves, ovens, fixed and portable warming units, deep fat fryers, open grills as source of heat
Electrical Distribution	Includes wiring, transformers, meter boxes, power switching gear, outlets, cords, plugs, lighting fixtures as source of heat
Appliances (including air conditioning/ refrigeration)	Includes televisions, radios, phonographs, dryers, washing machines, vacuum cleaners, hand tools, electric blankets, irons, electric razors, can openers, dehumidifiers, water cooling devices, air conditioners, refrigeration equipment as source of heat
Other Equipment	Includes special equipment (radar, x-ray, computer, telephone, transmitters, vending machine, office machine, pumps, printing press), processing equipment (furnace, kiln, other industrial machines), service, maintenance equipment (incinerator, elevator), separate motor or generator, vehicle in a structure, unspecified equipment
Open Flame, Spark (heat from)	Includes torches, candles, matches, lighters, open fire, ember, ash, rekindled fire, backfire from internal combustion engine as source of heat
Other Heat	Includes fireworks, explosives, heat or spark from friction, molten material, hot material, all other fires caused by heat from fuel-powered objects, heat from electrical equipment arcing or overloading, heat from hot objects not covered by above groups
Unknown	Cause of fire undetermined or not reported

* Fires are assigned to a cause category in the hierarchical order shown. For example, if the fire is judged incendiary and a match was used to ignite it, it is classified as incendiary and not open flame because incendiary is higher on the list. One minor deviation: If the fire involves air conditioning or refrigeration, it is included in appliances and not in electrical distribution.

changes in these two (or any other) causes since 1999 may be the result of a coding definitional change rather than a real-world change.

NFIRS fire data can be analyzed in many ways such as by the form of the heat of ignition, the material ignited, the ignition factor, or many other groupings. The hierarchy used in this report has proved useful in understanding the fire problem and targeting prevention, but other approaches are certainly useful too. Because the NFIRS database stores records fire by fire and not just in summary statistics, a very wide variety of analyses are possible.

Rounding

Percentages on each chart are rounded to one decimal point. Textual discussions cite these percentages as whole numbers. Thus, 13.4 percent is rounded to 13 percent and 13.5 percent is rounded to 14 percent.

Differences Between NFIRS and NFPA Data

There is an inconsistency between the NFIRS sample and the NFPA annual survey data: In nearly every year, the deaths reported to NFIRS are a larger fraction of the NFPA estimate of deaths than the NFIRS fires are of the NFPA estimate of fires. NFIRS injuries and dollar loss are even larger fractions of the NFPA totals than are deaths or fires. This issue is discussed further in Appendix A.

Unreported Fires

NFIRS only includes fires to which the fire service responded. In some states, fires attended by state fire agencies (such as forestry) are included; in other states, they are not.

NFIRS does not include fires from all states nor from many fire departments within participating states. However, if the fires from the reporting departments are reasonably representative, this omission does not cause a problem in making accurate national estimates for any but the smallest subcategories of data.

An enormous number of fires are not reported to the fire service at all. Most are small fires in the home or in industry which go out by themselves or are extinguished by the occupant. Based on a study done in the early 1970s, these unreported fires collectively cause a great deal of property loss and a large number of injuries requiring medical attention. The latest study of this problem was a 1984 report by CPSC.[7]

Perhaps the most disturbing type of unreported fires are those not submitted by fire departments that are participating in NFIRS. Some departments submit information on most but not all of their fires. Sometimes the confusion is systematic, as when no-loss cooking fires or chimney fires are not reported. Sometimes it is inadvertent, such as when incident reports are lost or accidentally not submitted. The information that is received is assumed to be the total for the department and is extrapolated as such. Although there was no measure of the extent of this problem in the past, the new NFIRS 5.0 provides fire departments with the capability to report this information in a simplified, more straightforward manner.

ORGANIZATION OF REPORT

This report is organized similarly to previous editions of *Fire in the United States*. Chapter 2 presents an overview of the national fire problem in terms of the total number of fires, deaths, injuries, and dollar loss—the four principal measures used to describe the fire problem.

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[7] *1984 National Sample Survey of Unreported Residential Fires: Final Technical Report*, prepared for the U.S. Consumer Product Safety Commission, Contract No. C–83–1239, Audits & Surveys, Inc., Princeton, NJ (1985).

Chapters 3 and 4 address the residential and non-residential fire problem, respectively. Chapter 5 addresses firefighter casualties. USFA resources that provide in-depth information on specific topics are listed at the end of these chapters.

Appendix A discusses the differences between NFPA and NFIRS data.

Most of the data are presented graphically for ease of comprehension. The specific data associated with the graphs are provided directly with the chart. In those instances in which it was impractical to fit the data, references are made to data tables that are presented in Appendix B.

This edition of *Fire in the United States* concludes with a topical index.